(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 207 899**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 86830142.5

(22) Date of filing: 27.05.86

(51) Int. Cl.⁴: A 23 B 5/04
A 23 L 3/36

(30) Priority: 28.05.85 IT 6748885

(43) Date of publication of application:
07.01.87 Bulletin 87/2

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: TERMIL di Rinaldi, Scarlata & C. S.n.c.
Via IV Novembre 50
I-12050 S. Giuseppe di Castagnito (Cuneo)(IT)

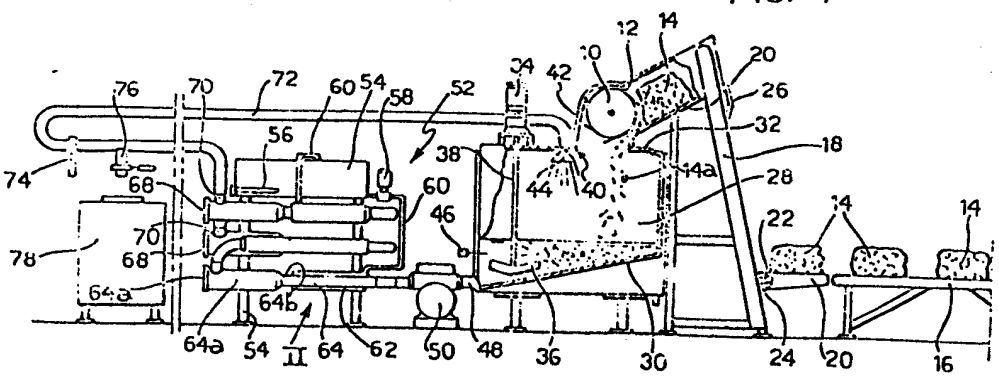
(72) Inventor: Scarlata, Lucio
Via IV Novembre 48
I-12050 San Giuseppe di Castagnito Cuneo(IT)

(74) Representative: Notaro, Giancarlo et al,
c/o Jacobacci-Casetta & Perani S.p.A. Via Alfieri, 17
I-10121 Torino(IT)

(54) **Plant and process for defrosting blocks of food products.**

(57) A plant for defrosting blocks (14) of frozen or deep-frozen food products, of the type with a flaking roller (10), uses a concentric-tube heat exchanger (52) to thaw the flakes, the heat exchanger having filter plates and a line for recirculating (72) the partially-thawed product to the tank (28) for collecting the flakes and to the exchanger (52) until the product has partially or completely thawed, substantially without thermal gradients within the thawed product.

FIG. 1



EP 0 207 899 A2

0207899

Plant and process for defrosting blocks of food products

The present invention relates to a plant for defrosting blocks of food products, particularly deep-frozen eggs, of the type including a flaking roller and means for thawing the flakes, as well as to a process carried out by this plant.

Deep-frozen blocks of food products must be defrosted in short times so as to avoid alteration of the products and render the process economically advantageous. Defrosting at ambient temperatures or in heated chambers has the disadvantages of considerably long operating times, the possibility of contamination due to the manual handling, and of regulation by operators.

In order to shorten the operating times, defrosting systems have been adopted which use thawing grids and heated Archimedean screws. Such systems have sizeable hot surfaces with which the deep-frozen product is in contact. This essentially static contact may cause irreversible changes when the product has a high protein content, for example as in egg yolks. These changes may, moreover, cause clogging of the thawing grids or of the heated screws.

Another defrosting method is that which uses rollers having blades for flaking the deep-frozen products. The flakes are subsequently thawed in systems similar to the thawing grids and hence with the same problems. Moreover, the storage of the product, because of the presence of unthawed flakes, may result in large solid masses collecting in the tank, with considerable problems as regards the pumping of the product for use.

The object of the present invention is to provide a highly automated plant for defrosting blocks of food products which does not have these disadvantages and which at the same time is cheap to make.

A further object of the present invention is to provide a process for defrosting blocks of food products which, as well as not having the aforesaid problems, is quick and safe from the point of view of lack of changes in the defrosted product.

According to the invention this is achieved by virtue of the fact that the means for thawing the flakes include a tank for collecting the flakes, a heat exchanger, and means for transferring the flakes and the thawed product to the heat exchanger and for recirculating them to the collecting tanks so as to achieve rapid thawing of the product with a uniform temperature in the liquid mass slightly above freezing.

By virtue of these characteristics, the thawing of the product occurs at temperatures such as not to cause irreversible changes in the product itself in that the high coefficient of heat exchange achieved in the heat exchanger allows the use of heating fluids at lower temperatures than in known heating systems with hot walls. Furthermore, the high turbulence achieved in the heat exchanger enables any localised temperature increases in the product to be avoided, ensuring that the heat exchanged substantially balances the latent heat of thawing of the treated product.

According to the invention, the collecting tank has agitators and is provided at its upper end with a sprinkler-diffuser through which the product is

recirculated.

This avoids the possible formation of solid masses within the tank and ensures that there is a sufficient head of liquid in the bottom of the tank itself for the pump means to recirculate the product.

According to a further characteristic, the exchanger is of the concentric-tube type and includes a series of mesh filter elements within the tube in which the product flows.

This device has the advantage that the flakes are partly broken up, even though solid, by the mesh filter elements under the pressure exerted by the pump means. The breaking of the flakes considerably reduces their thermal capacity and thus also reduces the time and degree of recirculation necessary to achieve complete thawing of the product.

According to the invention, the defrosting process is characterised in that the thawing of the flakes is achieved by the pumping of the flakes and the thawed product from the collecting tank to a heat exchanger, the recirculation of the product from the exchanger to the tank until the product has thawed to the desired extent, and the removal of the product itself.

Further advantages and characteristics of the plant and the process according to the present invention will become clear from the detailed description which follows, purely by way of non-limiting example, with reference to the appended drawings, in which:

Figure 1 is a schematic partially-sectioned side view of

the plant, and

Figure 2 is an enlarged detail of Figure 1.

With reference to the drawings, there is shown a flaking roller 10 with circumferential blades 12. Deep-frozen blocks 14 are fed automatically to the roller 10 by means of a conveyor belt 16, a tipper-elevator 18, and an inclined plane 20. The tipper-elevator 18 has a loading plane 20 articulated at 22 to the elevator 18 and provided with idle wheels 24 resting on suitable guides of the elevator 18.

The elevator 18 has cam surfaces 26 close to the inclined plane 20 and in correspondence with the guides.

The flaking roller 10 is located above a closed tank 28 having an inclined bottom 30 and an upper wall 32. A motor 34 is fixed to the outside of the wall 32 and, during operation of the plant, drives a bladed agitator 36 through a vertical shaft 38.

The wall 32 has an aperture 40 in correspondence with a duct 42 enclosing the flaking roller 10. In its upper part, the tank 28 has a sprinkler-diffuser 44 supported by the wall 32. The tank 28 also has a level sensor 46 located on a side wall at a height slightly above the agitator 36.

In the lowest part of the inclined bottom 30, the tank 28 has a discharge pipe 48 which connects the tank itself to a hollow-bodied volumetric pump 50. The delivery of the pump 50 is connected to a concentric-tube heat exchanger 52 supported by a structure 54. The exchanger 52 includes a

thermostatically-controlled vessel 54 for the heating fluid, normally water, heated by an electrical resistance 56. The heating fluid is circulated in jackets 62 surrounding the central tube 64 by means of a recirculating pump 58 and tubing 60. The central tube 64 of the exchanger 52 has larger-diameter portions 64a around which there is no heating jacket 62. The portions 64a are connected to the preceding tube 64 (in the direction of flow of the product) by frusto-conical connectors 64b and house tubular mesh filter elements 66 of the same diameter as the internal tube 64 of the exchanger 52.

At their ends opposite the frusto-conical connectors 64b, the portions 64a have blind closure flanges 68 and connectors 70 perpendicular to the side walls of the portions 64a. Each filter element 66 is in contact at one end with the tube 64 of the exchanger and at its other end with the blind flange 68.

The plant illustrated in the drawing has three identical portions 64a, the only difference relating to the tubular filter elements 66 which have mesh sizes that decrease from the first to the third element.

At the outlet of the last portion 64a of the heat exchanger 52 there is a recirculating tube 72 which connects the exchanger itself to the diffuser 44 of the collecting tank 28. The tube 72 includes an on-off valve 74 and a valve 76 for delivery of the product into a storage tank 78 for the thawed product.

During operation of the plant, the deep-frozen blocks 14 are advanced stepwise on the conveyor belt 16 and are loaded onto the plane 20 of the elevator 18 which

raises the blocks themselves to the level of the flaking roller 10. Close to the cam surfaces 26, the wheels 24 of the plane 20 engage the cams so as to rotate the plane 20 about the articulation axis 22 whereby the blocks 14 slide by gravity onto the inclined plane 20 and bear against the roller 10 driven by a motor (not illustrated). The roller 10 reduces the blocks 14 to flakes 14a by means of the blades 12 and the flakes fall onto the inclined bottom of the tank 28.

During the starting phase of the plant, a sufficient head of liquid (water or thawed product) will be provided in the tank 28 to enable the volumetric pump 50 to be started.

The agitator 36 maintains a uniform suspension of flakes in the liquid without danger of the formation of solid masses because of the low temperature of the flakes. Indeed, the temperature of the blocks 14 and hence of the flakes 14a is of the order of -20°C, whereby, in the absence of agitation, the flakes could cause part of the liquid in contact with them in the tank 28 to freeze and render the operation of the plant problematical.

The suspension of solid flakes and liquid product is pumped to the exchanger 52 in which the heating fluid is kept at a temperature of between 20 and 40°C. The pumped product is filtered through the first tubular mesh filter element 66 in which the flakes of product undergo a first crushing, being forced through the filter mesh by the pressure exerted by the pump 50. On leaving the filter portion 64a through the connector 70, the product undergoes further heating as it passes

through a second section of the exchanger 52 and reaches the second portion 64a in which the product is filtered through a finer-mesh element 66. The same applies to the third heating section and the third filter portion.

On leaving the exchanger 52, the suspension will thus contain a smaller percentage of solids due to thawing as a result of the heat exchange and smaller flakes due both to the thawing and particularly to the crushing as a result of the forcing through the filter element 66 by the pressure of the pump 50. The product thus transformed is recirculated to the tank 28 through the sprinkler-diffuser 44 which, together with the agitator 36, avoids the formation of solid masses.

When the product has thawed to the desired extent, the valve 74 is closed and the valve 76 is opened to transfer the product to the storage tank 78. The transfer will be effected as long as the level control 46 does not indicate a minimum level within the tank 28 to enable the starting of the defrosting of a further batch of blocks 14. The probe 46 may intervene automatically to stop the operation of the pump 50.

In addition to the semi-continuous operation just described, the plant is suitable for continuous operation subject to accurate regulation and control of all the variables in play. Equally, the product delivered may be sent directly for use instead of to the storage tank.

With the heating fluid at a temperature of the order of 30°, the product leaving the plant has a temperature of about 1 to 2°C, thus ensuring the absence of any

thermal changes in the product. Moreover, the automatic operation of the plant minimises the possibility of accidental contamination of the product.

The plant also has an automatic washing unit (not illustrated) which automatically directs a liquid containing detergent into the tank 28 and along all the tubes of the plant when the plant itself has finished operating.

It is understood that, the principle of the invention remaining the same, the constructional details and forms of embodiment may be varied widely with respect to that described and illustrated purely by way of non-limiting example, without thereby departing from the scope of the present invention.

CLAIMS

1. Plant for defrosting blocks (14) of food products, particularly deep-frozen eggs, of the type comprising a flaking roller (10) and means for thawing the flakes (14a), characterised in that these means comprise:

- a tank (28) for collecting the flakes,
- a heat exchanger (52),
- means (48, 50, 72, 44) for transferring the flakes (14a) and the thawed product to the heat exchanger and for recirculating them to the collecting tank, so as to thaw the product quickly without localised temperature increases within the liquid mass.

2. Plant according to Claim 1, characterised in that the collecting tank (28) has an agitator (36) and is provided at its upper end with a sprinkler-diffuser (44) through which the product is recirculated.

3. Plant according to Claim 1, characterised in that the exchanger (52) is of the concentric-tube type and includes a series of mesh filter elements (66) within the tube (64, 64a) in which the product flows.

4. Plant according to Claim 1, characterised in that the means include a volumetric pump (50) for pumping liquids with solids in suspension, a delivery tube from the tank (28) to the exchanger (52), and a recirculating tube (72) from the exchanger (52) to the tank (28).

5. Plant according to any one of the preceding claims, characterised in that it includes a belt conveyor (16) and a tipper-elevator (18) for the automatic supply of the blocks (14) to the flaking roller (10).

6. Plant according to any one of the preceding claims, characterised in that the collecting tank (28) includes a level sensor (46) by which the pump means (50) are governed.

7. Plant according to any one of the preceding claims, characterised in that it further includes an automatic washing unit which operates at the end of the working cycle.

8. Plant according to Claim 3, characterised in that the filter elements (66) of the series have meshes which decrease progressively in size in the direction of advance of the product.

9. Process for defrosting blocks (14) of food products, particularly deep-frozen eggs, of the type including the steps of reducing the blocks to flakes (14a) and thawing the flakes themselves, characterised in that the thawing is achieved by means of pumping the flakes and the thawed product from a collecting tank (28) to a heat exchanger (52), recirculating the product from the exchanger to the tank until the product has thawed to the desired extent, and removing the product itself.

0207899

FIG. 1

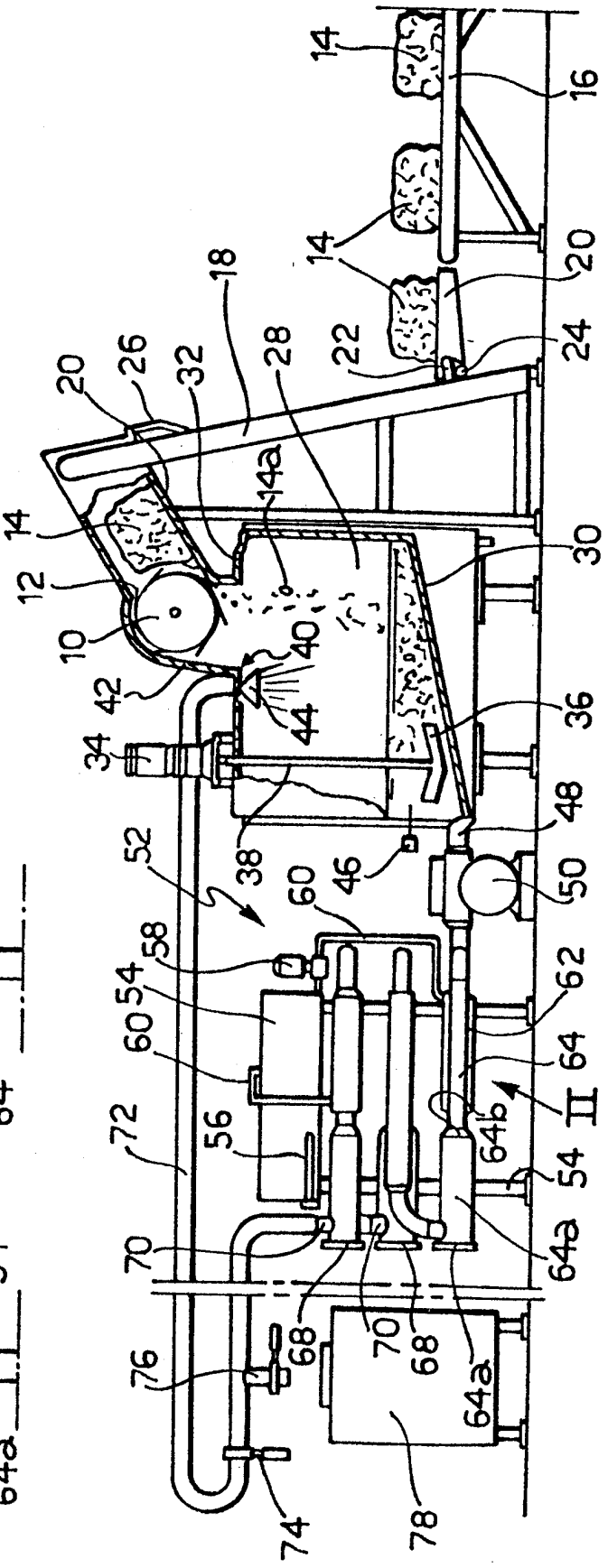
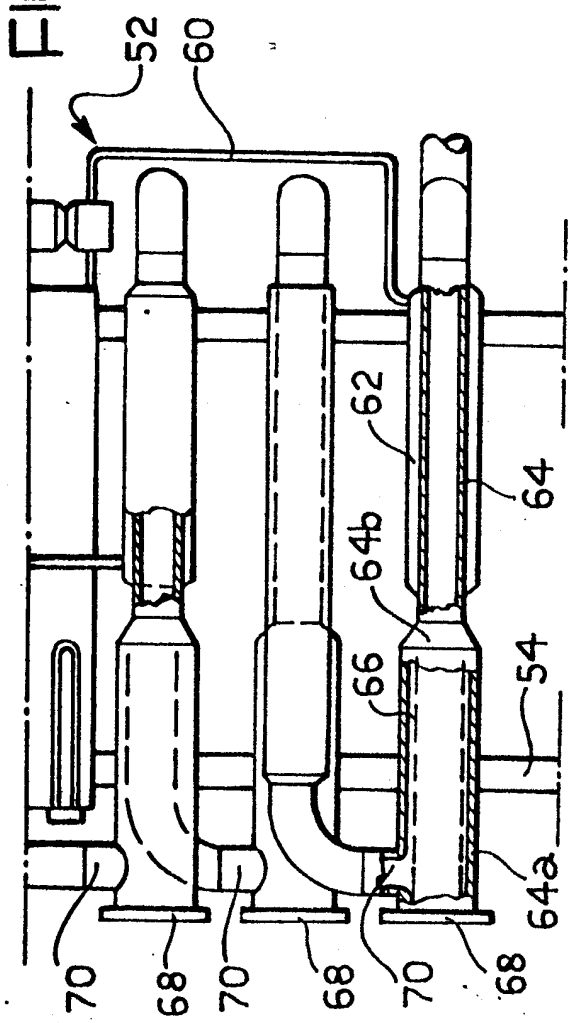


FIG. 2



PUB-NO: EP000207899A2
DOCUMENT-IDENTIFIER: EP 207899 A2
TITLE: Plant and process for defrosting blocks of food products.
PUBN-DATE: January 7, 1987

INVENTOR-INFORMATION:

NAME	COUNTRY
SCARLATA, LUCIO	N/A

ASSIGNEE-INFORMATION:

NAME	COUNTRY
SCARLATA RINALDI & C TERMIL	IT

APPL-NO: EP86830142
APPL-DATE: May 27, 1986

PRIORITY-DATA: IT06748885A (May 28, 1985)

INT-CL (IPC): A23B005/04 , A23L003/36

EUR-CL (EPC): A23G009/04 , A23B005/045 , A23L003/365

ABSTRACT:

CHG DATE=19990617 STATUS=O> A plant for defrosting blocks (14) of frozen or deep-frozen food products, of the type with a flaking roller (10), uses a concentric-tube heat exchanger (52) to thaw the flakes, the heat exchanger having filter plates and a line for

recirculating (72) the partially-thawed product to the tank (28) for collecting the flakes and to the exchanger (52) until the product has partially or completely thawed, substantially without thermal gradients within the thawed product.